



**Re: Draft Dunkard Creek (Joint?) press release**



**Louis Reynolds to: David Sternberg**

**11/05/2009 04:30 PM**

**Cc: Chad Harsh, Eric Carlson, Nina Rivera**

**If we take a look at Whitely just to the North, its a repeat of this train wreck. I wo huge sediment ponds cranking out 10,000 uS into Whitely.**

**[http://maps.google.com/maps?sourceid=navclient&rlz=1T4GGLL\\_enUS338US338&q=Mapletown,PA&um=1&ie=UTF-8&hq=&hnear=Mapletown,+PA&gl=us&ei=Gz3zSuqOPJXJIQewy5WwAw&sa=X&oi=geocode\\_result&ct=image&resnum=1&ved=0CAkQ8gEwAA](http://maps.google.com/maps?sourceid=navclient&rlz=1T4GGLL_enUS338US338&q=Mapletown,PA&um=1&ie=UTF-8&hq=&hnear=Mapletown,+PA&gl=us&ei=Gz3zSuqOPJXJIQewy5WwAw&sa=X&oi=geocode_result&ct=image&resnum=1&ved=0CAkQ8gEwAA)**

**I am off tomorrow - back in on Monday. I'll read the release tomorrow morning....**

**lou**

**Lou Reynolds  
USEPA Region III  
Freshwater Biology Team  
1060 Chapline St. Ste. 303  
Wheeling, WV 26003-2995  
P 304-234-0244  
F 304-234-0260**

**David Sternberg**

**I put together a draft press releas...**

**11/05/2009 04:20:12 PM**

**From: David Sternberg/R3/USEPA/US  
To: Chad Harsh/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA  
Cc: Nina Rivera/R3/USEPA/US@EPA, Eric Carlson/R3/USEPA/US@EPA  
Date: 11/05/2009 04:20 PM  
Subject: Draft Dunkard Creek (Joint?) press release**

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**I put together a draft press release for when we release our report. It is written with the intention that we can hopefully get Pa. and W.Va. to sign on.**

**[attachment "Dunkard Creek. PR.doc" deleted by Louis Reynolds/R3/USEPA/US]**

**Let me know your thoughts. Thanks,**

**David**



**Dunkard Creek:**  
**Management Planning Dialogue**

Convened by CONSOL  
and the West Virginia Department of Environmental Protection

**Meeting Summary v1**

*West Virginia Department of Environmental Protection  
601 57<sup>th</sup> Street South East, Charleston, WV 25304  
Coopers Rock Training Room OR West Virginia Room (Reception Desk will Instruct)*

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**Attendees**

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Adam Saslow  
Curt Gervich  
Mindy Armstead  
Beth Burdette  
Pat Campbell  
Ken Ellison

Loraine Fries  
Dr. David Hambricht  
Ben Lowman  
Scott Mandirola  
Jonathan Pachter  
Scott Rasmussen

Lou Reynolds  
Dr. John Rodgers  
Rick Spear  
John Wirts

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**Goals for This Meeting**

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**At the end of the first day, participants will have:**

- Developed a collaborative culture for dialogue
- Firmly agreed upon a framework for memorializing desired outcomes
- Identified key questions for discussion and investigation
- Defined the variants that must be controlled for preventing future algal blooms

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**November 30, 2009**

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*Plexus Logistics International  
Two Midtown Plaza - Suite 2000, 1349 West Peachtree Street, NW, Atlanta, GA 30309  
Tel: 404.969.0747 Fax: 404.347.9080*

### Introductions and Orientation to the Dialogue

In his opening remarks, Cabinet Secretary Randy Huffman welcomed participants from Consol Energy and the West Virginia Department of Environmental Protection (WV DEP) and described his intentions and objectives for holding this two day discussion. Secretary Huffman provided a brief timeline of events related to the fish kill on Dunkard Creek. The secretary suggested that the purpose of the two day meeting was to better understand the science associated with *P. Parvum* and to develop a strategy for managing Dunkard Creek in such a way that either (or both)

Secretary Huffman and other participants agreed that the discussions at hand were not convened to assign blame for the Dunkard Creek fish kill, to set policy or to develop an overarching watershed management plan for Dunkard Creek. The neutral facilitation team would limit discussion to topics that would enhance the group's understanding of the science related to *P. Parvum* and preventing future fish kills from occurring.

Mr. Adam Saslow, Vice President of Sustainability Programs at Plexus Logistics International, introduced several administrative topics and rules for discussion, such as the code of conduct. One participant (LOU) asked if a new participant from US EPA's regional office could attend the meetings and the group (CONSOL) declined. At Mr. Saslow's request participants discussed whether the document produced at the end of the two day dialogue should be publically available and if the document should include participants' names or maintain anonymity. The group opted to allow the document to be circulated among a small number of administrators and staff members at Consol and various government agencies, and that group members' names should not be included in the document. Mr. Saslow emphasized that all participants would have the opportunity to revise the report upon a completion of draft version prior to circulation outside of the group.

### Recent History and the Current State of Play – Panel Discussion

Mr. Saslow explained the mechanics of the Expert Panel Discussion. Consol and WV DEP were asked to bring in four experts on green algae. Each of the experts (named below) was asked to craft a 10-15 minute presentation. At the end of that time, the experts would cross-analyze the work and thinking of the others. Following that exchange, the other participants would be permitted to question the experts. The four experts were:

- Mindy Y. Armstead – Senior Scientist, Potesta & Associates, Incorporated
- ~~\_\_\_\_\_~~
- Loraine T. Fries – Program Director, Texas Wildlife and Parks Department
- Dr. K. David Hambricht – University of Oklahoma Biological Station
- Dr. John H. Rodgers – Professor, Clemson University

Deliberative Process

Each member of the panel presented data and viewpoints concerning the life history and ecology of *P. Parvum* as well as a variety of hypothesis about how the species may have come to occur in Dunkard Creek, bloom and produce its deadly ~~icthiotoxin~~ ~~icththyotoxin~~ ~~icththyotoxin~~. Key relationships and discussions occurred around several issues identified by the data that panelists presented. Observations and discussions that had high levels of agreement among panelists were hotly contested, or which raised questions about which panelists were unsure regarding *P. Parvum* are presented below. These discussions concerned the relationships among *P. Parvum* and:

- **pH:** panelists agreed that *P. Parvum* tends to thrive in areas with a pH above 7.5 and often around 8, although the organism has been known to bloom in lower pH conditions. Panelists agreed that it is likely that the organism cannot survive at levels of pH near or below 6. This is supported by recent literature.
- **Stream salinity:** panelists agreed that *P. Parvum* seems to be more successful in waters with higher chloride counts (and more generally with high levels of total dissolved solids (TDS)). Panelists were unsure, however, if the success at blooming that *P. Parvum* exhibits at higher salinities is because high salinities trigger growth in the organism or if *P. Parvum*'s competitors are unable to out-compete the organism at these salinity levels (leaving *P. Parvum* with a competitive edge in high salinity environments). CONSOL made it a point (after a lengthy caucus), to not discuss TDS. In their words – we will not discuss TDS.
- **Stream flow and *P. Parvum* mobility:** Panel members participated in a lively and contested discussion about the role of stream flow in *P. Parvum* mobility and ability to gain a foothold in Dunkard Creek. At issue was the rate of flow in Dunkard Creek, and whether the creek's rate of flow represented naturally occurring flow rates for a stream of its size in the area. One hypothesis and motivation underlying this discussion was to determine if the creek's current rate of flow was below what would naturally occur in a creek of Dunkard's size and topography, and if the reduced rate of flow may have allowed *P. Parvum*, which is typically thought of as a lake algae, to gain a foothold. There was ample conversation centered on the impacts of channeling and recontouring the river flow as though the site were a 404 mitigation site. If such a solution were designed, the Creek might better "flush" the algae from the ecosystem. Of course there was concern expressed over the downstream implications. Panelists were unable to come to agreement about whether or not managing for flow rates would have any effect on the survival of *P. Parvum*. The main issue here is what is possible. There ARE plans to remove two dams in Dunkard, which will significantly alter geomorphology of the stream. Beyond this, it is not possible to increase the slope and flow of the channel.
- **Nutrient regimes and nitrogen to phosphorus ratios:** Panelists agreed that basic data regarding nitrogen and phosphorus are confounding in regards to *P. Parvum* blooms and toxicity levels. One panelist (Hambright), however, presented compelling data regarding the ratio of nitrogen to phosphorus (N:P). At high N:P *P. Parvum* seems less likely to produce ichthyotoxins. At low level ratios (as in the late summer of 2010), the production of ichthyotoxin seems to increase. The arguments came in the ability to quickly and effectively control N:P ratios in Dunkard. There is a lot of evidence, for example, that groundwater will hold a long term pool of P and can serve as a source of P for a decade. I made the point that while EPA would love to control nutrients in watersheds like Dunkard (and there is no reason to think that Dunkard is any different than other streams in the Mon basin) it is more effective in the short run to control TDS.
- **Competitor species:** many of the discussions that occurred among participants centered on the ambiguity of the relationships between *P. Parvum* and the aquatic environment, versus the aquatic environment and *P. Parvum*'s competitors. In other words, panelists were unable to come to agreement, or were equally unsure, about whether patterns in the occurrence of *P. Parvum* blooms and toxicity were related to the organism's response to changes in the environment, or if *P. Parvum* responds to shifts in population levels of competitor species, which may respond to shift in the aquatic environment. The argument here is between Potesta and Associates and the State scientists. The state folks have data that show and are convinced that there is a community of

stream (lotic) algae and flagellates. Ms. Armstead argued vociferously that this was not the case – in essence, there is no such thing as lotic water column (algae community is entirely comprised of benthic diatoms and attached algae). That is, there is no competition.

- **Differences between *P. Parvum* blooms and toxin production:** Participants agreed that there were cases of *P. Parvum* blooms that were unassociated with fish kills, and cases of *P. Parvum* related fish kills that were unassociated with algae blooms. Therefore, panelists agreed *P. Parvum* blooms did not necessarily mean fish kills were eminent and vice versa. Additionally, participants agreed that the conditions in which *P. Parvum* can survive, bloom and produce toxin are different, varied and as a result, difficult to pinpoint.

#### The Levers for a Management Plan

Mr. Saslow facilitated an open discussion among experts AND stakeholders designed to identify key variables for controlling algal blooms and the parameters for their optimization. Participants agreed that the ambiguity of the data and diverse perspectives of panelists made talking about management levers at this point problematic. Instead the group opted to continue discussions about science related to *P. Parvum*. There were several outcomes of the discussion. These were:

- further recognition of the group's limited understanding of *P. Parvum* and as a result the difficulty of managing the species;
- a philosophical discussion about the role of management and adaptive management in the face of ambiguity;
- further focus on the "competitor theory" of *P. Parvum*, meaning that patterns related to *P. Parvum* reproduction and toxin production may be more related to the success of *P. Parvum* competitor's than to *P. Parvum*'s response to aquatic conditions;
- continued focus on N:P as an indicator of *P. Parvum* bloom and toxin production.

One panelist presented a general population model that presented one explanation of the way that *P. Parvum* responds to N:P ratios. This model postulated that *P. Parvum* populations rise at increasing rates as the N:P ratio increases until *P. Parvum* populations reach a point where they are nutrient starved at which point the population declines for a short time as the N:P ratio falls. At this point *P. Parvum* begins to produce toxin and kills fish.

From this point of discussion participants attempted to decipher the presence of an indicator that signaled *P. Parvum* was nearing initial population peak, and that toxic production was imminent. The group was unable to determine if such an indicator existed although panelists suggested their research was nearing that level of knowledge.

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December 1, 2009

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The discussion resumed where yesterday's concluded.

### The Levers for a Management Plan

That is, with further discussion of science related to *P. Parvum* for the general purpose of honing in on potential management levers for preventing further *P. Parvum* related fish kills. Mr. Saslow focused the group's discussion on three key areas that seemed to have group support as the most likely candidates for serving as management levers to prevent future *P. Parvum* fish kills on Dunkard Creek. These four areas and a summary of the discussion that centered on each are presented below:

- **Salinity and Conductivity:** Several group members presumed this to be a definitive cause of *P. Parvum* growth and point to evidence that suggests that as salinity and conductivity increase, *P. Parvum* blooms become more common in areas where the algae is known to occur. As the group examined data related to this point on Dunkard Creek they came to the conclusion that this relationship often holds true, but not always.  
I made the assertion that *P. parvum* is a saltwater algae. Dr. Rodgers countered that it is a euryhaline algae. I will concede that this algae is euryhaline but with a preference for saltwater. Dr. Rodgers refused to give up this point even when Dr. Hambright related the possibility of controlling blooms in Lake Texoma if they re-routed the rivers that flowed through the saline geology into the lake.  
Lorraine Fries related a story that in net pens off the coast of Norway, salmon are lowered into the colder, denser, fresh water during blooms of *P. parvum*.
- **Nutrient management and N:P:** Throughout the ongoing discussion, participants frequently requested additional data and participants all worked hard to make this data available immediately. At several points group members telephoned and emailed colleagues to find and provide data to the group. One such instance occurred when group members collaborated to analyze data related to the N:P ratios in Dunkard Creek in the months leading up to the recent fish kill. This effort revealed that in years prior to the fish kill the N:P ration rarely dropped below what panelists considered a "trigger point" for *P. Parvum* and when N:P did reach this level it was only for a short time. In the months just prior to the kill however, the N:P ratio dropped below the trigger point and did not rise, lending further support for N:P role in *P. Parvum* growth and toxicity. It seems that a major point of contention among the group was the ability to use N:P as a management lever. For many years natural resource management agencies have worked to reduce nutrient levels in streams and the data presented related to *P. Parvum* suggests that an increase in nitrogen, or an isolated decrease in phosphorus (which group members agreed was difficult to achieve because nitrogen and phosphorus are often coupled) was the necessary management response for preventing *P. Parvum* growth and toxic production.
- **pH:** Participants were in agreement that there does seem to be a clear relationship between pH and *P. Parvum*. That is, the organism seems to occur in areas with higher pH. Group members also agreed that pH was a relatively easily managed element of water quality, since Consol already manages for pH at their water discharges on Dunkard Creek. Group members did highlight several difficulties related to lowering pH in Dunkard Creek. Three of these were:

1. lower pH increase the likelihood of iron staining;

2. lowering pH to the point that it kills *P. Parvum* may also threaten other species and;
3. lowering pH may be a violation of the clean Water Act.
4. The other big problem here is the feasibility of actually lowering pH given the buffering capacity of Dunkard Creek.

Formatted: Bullets and Numbering

The group began to develop a "Dashboard" of indicators, levers and pros and cons of management. This was clearly a first cut with much work and progress to continue:

## THE GOLDEN ALGAE DASHBOARD

Indicators	Levers	Desired Outcome	Pros	Cons
Chloride Management	Reverse Osmosis			Scaling
				Cleaning filters
	Use of local ponds for dilution			
	Augmentation Wells			
	Evaporation			Disposal of salt cakes
	Recycling of water			Corrosion of equipment
PH	Lower AMD from 8 or so to 6.0 in low flow times of year.			Iron Staining
				Uncertainty
TDS				
Nutrients	Buffer zones for Phosphorous.			
	Agricultural BMP's			
	Improved WWT to drop out Phosphorous			Cost to consumer
	Watershed-wide Wastewater Treatment Systems (POTW?)			
	Wastewater assessment/feasibility study			

Indicators	Levers	Desired Outcome	Pros	Cons
Water Quantity Management and Velocity	Storage and timed releases			
	Channel design, re-contouring and re-routing (restoration)			
	Wells			
Natural Competition	Filter feeders			
	Phytoplankton at lower salinity			
Temperature				

#### Monitoring for the Efficacy of Management Strategies

The group began to specifically define the timing of monitoring and appropriate protocols. This was clearly a first cut with much work and progress to continue:

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## Monitoring in Dunkard Creek

Purpose <sup>1</sup>	Indicators	Frequency	Location	Protocol	Low End Parameter	High End Parameter	Actions
Understanding prevention	pH	Weekly	12-15 stations of DC	Hydro laboratory			
Water Quality Affecting fish populations	Specific Conductance	Field chemistry - continuous but grabbed weekly	3-4 Locations	Hydro laboratory			
Water Quality Affecting fish populations	Total Dissolved Solids (TDS - e.g., Sulfur, Magnesium, metals)	Weekly or Bi-weekly	3-4 Locations (as a precursor)	As appropriate			
Water Quality Affecting Algal Blooms	Nutrients (full N and P chemistry)	Bi-weekly	5 locations	Standard Methods			
Water Quality Affecting fish populations	Sulfates	Field chemistry - continuous but grabbed weekly	3-4 Locations	Hydro laboratory			
Water Quality Affecting fish populations	Dissolved Oxygen	Field chemistry - continuous but grabbed weekly	3-4 Locations	Hydro laboratory			
Water Quality Affecting fish populations	Chlorides	Weekly or Bi-weekly	3-4 Locations	As appropriate			
Context and Recovery	Type and volume of fish populations	June	6 (Mason Dixon, Pentrus, Blacksville, Wana, Miracle Run, above Brave, and then 3-4 in PA - Church, Musky Bridge.)	State Protocol			

<sup>1</sup> Note: Green coding is highest priority monitoring, yellow coding is not quite as important and red coding is more of a luxury.

<u>Purpose<sup>1</sup></u>	<u>Indicators</u>	<u>Frequency</u>	<u>Location</u>	<u>Protocol</u>	<u>Low End Parameter</u>	<u>High End Parameter</u>	<u>Actions</u>
Context and Recovery	Type and volume of fish populations	Tri-ennial	6 (Mason Dixon, Pentrus, Blacksville, Wana, Miracle Run, above Brave, and then 3-4 in PA - Chuch, Musky Bridge, )	State Protocol			
Monitor Algal Community	Periphyton	Seasonally	6 locations	RBP			
Understanding and managing	Water flows (flow stage discharge)	Weekly	3 locations	USGS Protocol			
Early warning/understanding	Toxicity - ITU	Weekly (when algal cells present)	12-15 stations of DC	Modified Israeli Protocol (Bio-assay)			
Water Quality Affecting Algal Blooms	Temperature	Field chemistry - continuous but grabbed weekly	3-4 locations	Hydrolaboratory			
Water Quality Affecting fish populations	Osmotic Pressure	Weekly	8 Stations in PA	Standard Methods (in PA)			
Early warning/understanding: Monitor Algal Community	Cell counts (of entire assemblage)	Weekly or more often	12-15 stations of DC	Texas/Hemacytometer Protocol (preferably in volumes of two filters or more)			
Water Quality Affecting Invertebrate Benthos	Chlorides (as a surrogate for salinity)	Weekly		Standard Protocols			
Water Quality Affecting Invertebrate Benthos	Benthic Community (Mussels and Other Invertebrates)	Bi-annually	4 Points at the Mouth of Major Tributaries etc...	RBP and TBA (for mussels)			
Early warning/understanding	PP density and	Often and more often	12-15 stations of DC	PCR			

Purpose <sup>1</sup>	Indicators	Frequency	Location	Protocol	Low End Parameter	High End Parameter	Actions
Early warning and understanding	Toxic concentrations	Often and always when	2-15 stations of DC	Analytical Chemistry			
Understanding and managing	Turbidity	Field chemistry - continuous but grabbed weekly	12-15 stations of DC	Hydro laboratory			
Understanding and managing	Chlorophyll A	Weekly	12-15 stations of DC	Standard Methods			
Understanding and managing	Nitrate-Nitrite	Quarterly	12-15 stations of DC	Standard Methods			
Understanding and managing	Organic Suite	Quarterly	12-15 stations of DC	Standard Methods			
Understanding and managing	ToxTune BCL	Quarterly	12-15 stations of DC	Standard Methods			
Understanding and managing	Hardness and Alkalinity	Quarterly	12-15 stations of DC	Standard Methods			
Understanding and managing	Temperature	Quarterly	12-15 stations of DC	Standard Methods			
Understanding and managing	BOD	Daily	12-15 stations of DC	Standard Methods			
Load/dilution	Continuous flow at large outfalls	Continuous	TBD	As per NPDES			
	Pumping rates and discharge flows		Two CONSOL stations				
	GIS: NPS Inventory						
	GIS: Point Source Inventory						
Flow cytometry - can group many of the above							
HydroLab can collect continuous data along seven criteria							

#### Next Steps and Action Items

1. Jonathon Pachter will write a brief statement to be reviewed by all participants regarding the purpose of these meetings *not* being to develop policy, but to focus on science related *P. Parvum* for purposes of informing policy related to preventing future fish kills on Dunkard Creek. (We may not need this any longer)
2. Lou Reynolds will provide group with nutrient data from Dunkard Creek from 1995-1997.
3. John Wirts will collect and forward to Plexus all recent (October and November) monitoring data. Plexus will
4. Rick Spear will look into the proposed removal of a dam on Dunkard Creek. Clearly this will impact the chemical and physical characteristics of the creek and potentially mask or confound any monitoring efforts that are placed on the creek. Mr. Spear will follow up with American Rivers – the group that is coordinating the dam removal project.
5. CONSOL will work with Paul Zimekiewicz at West Virginia University to develop a monitoring plan for Dunkard Creek and will circulate to the group for comment when completed (December 11 or so).
6. Rick Spear will provide participants with water chemistry data that corresponds to the biotic index data and list of taxa occurrences that he provided.
7. Frank Jernejcic will provide a timeline of events just prior to, during and since the fish kill on Dunkard Creek. Also will provide data regarding tissue and blood samples taken from fish on Dunkard Creek during fish counts after the fish kill.
8. The group agreed that a GIS model of the watershed was a high priority, though no one volunteered to take on this effort (Note: Plexus can take this on if necessary).

Respectfully submitted,

Adam R. Saslow  
Vice President – Sustainability Programs  
Plexus Logistics, International





**Re: Fw: Dunkard Creek report**

**Louis Reynolds to: Angela McFadden**

**11/22/2010 02:27 PM**

**Cc: Chad Harsh, David Sternberg, John Forren, Margaret  
Passmore, Michael Kulik, Nina Rivera, Troy Jordan**

**The USGS gauge at Shannopin was offline from August 19 - September 23, 2009. On September 23, that gauge read a max of 10,100 (4000 higher than anything we saw this year). The WVDEP measured conductivities of the discharge (005) on September 3, 2009 of 34,400. This is incredibly high. I doubt this level of conductivity is possible from coal mining alone. If we are not investigating gas drilling (I think we have, actually) then we certainly should.**

**Lou Reynolds  
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Freshwater Biology Team  
1060 Chapline St. Ste. 303  
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P 304-234-0244  
F 304-234-0260**





**Re: Fw: Dunkard questions**

**Louis Reynolds to: David Sternberg**

**10/11/2011 01:23 PM**

**Chad Harsh, Christine Guitar, Daniel Ryan, David  
Cc: Bloomgren, John Forren, Jon Capacasa, Margaret  
Passmore, Martin Harrell, Nina Rivera, Terri-A White,**

**Loveridge is upstream of the Blacksville #2 Mine and is also high in TDS (historically and currently). The golden algae bloom is believed to have originated in a beaver pond between Blacksville #2 and the St. Leo Discharge (Loveridge Mine).**

**Lou Reynolds  
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1060 Chapline St. Ste. 303  
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P 304-234-0244  
F 304-234-0260**

**David Sternberg**

**Thanks Lou, Our fact sheet also re...**

**10/11/2011 10:35:17 AM**

**From: David Sternberg/R3/USEPA/US  
To: Louis Reynolds/R3/USEPA/US@EPA  
Cc: Chad Harsh/R3/USEPA/US@EPA, Christine Guitar/DC/USEPA/US@EPA, Daniel Ryan/R3/USEPA/US@EPA, David Bloomgren/DC/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Jon Capacasa/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Martin Harrell/R3/USEPA/US@EPA, Nina Rivera/R3/USEPA/US@EPA, Terri-A White/R3/USEPA/US@EPA, William Smith/R3/USEPA/US@EPA  
Date: 10/11/2011 10:35 AM  
Subject: Re: Fw: Dunkard questions**

**Thanks Lou,**

**Our fact sheet also referenced Loveridge as a contributor. Was that based on sampling subsequent to the kill or historically high TDS from Loveridge.**

**Please Advise. Thanks,**

**David**

**Louis Reynolds**

**David - That is accurate.**

**10/11/2011 08:13:24 AM**

**From: Louis Reynolds/R3/USEPA/US**

**To:** David Sternberg/R3/USEPA/US@EPA  
**Cc:** Chad Harsh/R3/USEPA/US@EPA, Christine Guitar/DC/USEPA/US@EPA, Daniel Ryan/R3/USEPA/US@EPA, David Bloomgren/DC/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Jon Capacasa/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Martin Harrell/R3/USEPA/US@EPA, Nina Rivera/R3/USEPA/US@EPA, David Sternberg <Sternberg.David@epamail.epa.gov>, Terri-A White/R3/USEPA/US@EPA, William Smith/R3/USEPA/US@EPA  
**Date:** 10/11/2011 08:13 AM  
**Subject:** Re: Fw: Dunkard questions

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David -

That is accurate.

Thanks,

Lou

Lou Reynolds  
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Freshwater Biology Team  
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David Sternberg	Lou, Would the following summary...	10/07/2011 03:15:42 PM
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**From:** David Sternberg/R3/USEPA/US  
**To:** Louis Reynolds/R3/USEPA/US@EPA  
**Cc:** Chad Harsh/R3/USEPA/US@EPA, Christine Guitar/DC/USEPA/US@EPA, Daniel Ryan/R3/USEPA/US@EPA, David Bloomgren/DC/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Jon Capacasa/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Martin Harrell/R3/USEPA/US@EPA, Nina Rivera/R3/USEPA/US@EPA, Terri-A White/R3/USEPA/US@EPA, William Smith/R3/USEPA/US@EPA, David Sternberg <Sternberg.David@epamail.epa.gov>  
**Date:** 10/07/2011 03:15 PM  
**Subject:** Re: Fw: Dunkard questions

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Lou,

Would the following summary of your answer for public consumption be an accurate (albeit incomplete) response to his question?

"EPA has not alleged that mine drainage was the sole cause of the fish kill. What has been alleged is well summarized in the attached fact sheet under the heading

**"violations" as well as in the press release.**

**<http://www.epa.gov/compliance/resources/cases/civil/cwa/consol.html>**

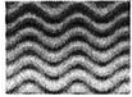
**The evidence to support the allegations includes the fact high levels of TDS were the necessary precursor to the toxic algae bloom and subsequent kill, and the amount of TDS flowing from the Blacksville #2 discharge at the time of our sampling was adequately sufficient to promote the growth of golden algae."**

**Let me know. Thanks,**

**David**

**David**





**Another algae update**

**Bonnie Smith, John Forren,**  
**Louis Reynolds to: Chad Harsh, Samantha Beers, 09/24/2009 07:59 AM**  
**John Pomponio, Nina Rivera**  
**Cc: Frank Borsuk, Margaret Passmore, Greg Pond, Amy**  
**Bergdale, Kelly Krock**

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**History: This message has been forwarded.**

Lou



Dunkard Creek algae bloom update.doc

→ release

Lou Reynolds  
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## Update on Dunkard Creek

The Freshwater Biology Team sampled Dunkard Creek on Sunday to explore the hypothesis that an algae bloom might be responsible for the fish kill. This idea has been around for a week or so, but was bolstered by a WVDEP fly-over last Friday. Inspectors from WVDEP noted that the water was discolored and stained over the entire length of Dunkard Creek and this staining originated at a beaver dam in the headwaters of the West Virginia Fork of Dunkard Creek. This beaver pond is upstream of the Blacksville #2 mine, but downstream of another outfall from Consol's St. Leo Mine (WV0040711, 016 is the main outlet.)

USEPA sampled five sites and WVDEP sampled two sites on Sunday. We have a presumptive identification of *Prymnesium parvum* but this genus is very similar to *Chrysochromulina* sp. The expert that identified *Prymnesium parvum* supplied the following from their experience with this algae in Texas:

- The species was discovered in 1985 on Texas' Pecos River. This was the first recorded occurrence in the Western Hemisphere, and Texas had occasional blooms until 2001. Since 2001 we have had *P. parvum* blooms every year like clockwork.
- We are not sure what triggered the widespread bloom in 2001 or what has caused the blooms to go from an occasional happening to a seasonal occurrence.
- *P. parvum* can tolerate a wide range of temperatures and salinities (brackish water to full seawater salinities).
- In Texas it's a winter bloomer due to its tolerance for cold temps. Once temps have knocked down populations of competing algae, *P. parvum* will take advantage of the available nutrients and bloom.
- We begin seeing small blooms in October through the holidays. Our large, long-term blooms usually begin right around the first of the year. We have to have long periods of cold that will drop the water temperature & knock out the rest of the algal population. It usually takes until December/January for this to happen.
- Blooms are not always toxic. You can see upwards of 50,000 cells/ml and no dead fish.
- *P. parvum* turns toxic when nutrients are scarce. They are mixotrophs, able to utilize nutrients in the water or release their toxin, kill surrounding organisms, and feed off them. Dr. Edna Graneli (Sweden) has documentation of *P. parvum* feeding on blood cells collected from a horse.
- Conversely, in nutrient-limited conditions you can see toxic blooms in low concentrations (a few thousand per ml).

I also talked with an expert that confirmed this identification from photos and wants a fresh sample to confirm the identification. He also explained that this algae only thrives in saline waters.

**Chad**

----- Forwarded by Chad Harsh/R3/USEPA/US on 09/14/2009 11:52 AM -----

**From:** "Zeto, Michael A" <Michael.A.Zeto@wv.gov>  
**To:** Chad Harsh/R3/USEPA/US@EPA  
**Date:** 09/14/2009 11:23 AM  
**Subject:** FW: Sample Results from Dunkard Creek Fish Kill

---

I need to speak with you

**From:** Foster, Minter C  
**Sent:** Monday, September 14, 2009 9:16 AM  
**To:** Zeto, Michael A; Hickman, Joseph M  
**Cc:** Swiger, Bradley C  
**Subject:** Sample Results from Dunkard Creek Fish Kill  
**Importance:** High

Attached are the sample results from September 9, 2009 on Dunkard Creek. If you have any questions let me know. Additional results will be forwarded when we receive them.



Minter Dunkard Fish Kill 9-4-09 Sample Results.xlsx

----- Forwarded by Judith Hykel/R3/USEPA/US on 09/15/2009 09:03 AM -----

**Chad**

**Harsh/R3/USEPA/US**

**09/14/2009 08:45 PM**

**To Steve Platt/R3/USEPA/US@EPA**

**cc Angela McFadden/R3/USEPA/US@EPA, Dave  
Rectenwald/R3/USEPA/US@EPA, David  
McGuigan/R3/USEPA/US@EPA, Judith  
Hykel/R3/USEPA/US@EPA, KarenD  
Johnson/R3/USEPA/US@EPA, Roger  
Reinhart/R3/USEPA/US@EPA, Stephen  
Field/R3/USEPA/US@EPA**

**Subject Re: Fw: Sample Results from Dunkard Creek Fish  
Kill** 

**I don't know for sure if the injection well and Blacksville #2 are hydraulically connected. If they are connected, I would not be surprised if the injection well did not contribute in any meaningful way to the fish kill or the elevated TDS levels in the Mon. I do know that WV is considering ordering Consol to stop discharging at Blacksville #2. I think that if there is any chance the injection well is contributing to the problem by volume or pollutant that we should have a discussion. I guess the**

problem is, unfortunately, that it is an easy target and some folks may not fully understand the permit. If the injection well makes sense and we can tell that story to WV, PA and the public then that's what we should do. There are ongoing efforts to identify other causes of the fish kill. Attached is a field report from Wheeling.



dunkard.doc

**Re: Fw: Sample Results from Dunkard Creek Fish Kill**



**Re: Fw: Sample Results from Dunkard Creek Fish Kill** 

**Steve Platt to: Chad Harsh**

**09/14/2009 02:56 PM**

**Angela McFadden, David McGuigan, Judith Hykel,  
Cc: KarenD Johnson, Stephen Field, Dave Rectenwald,  
Roger Reinhart**

**Chad,**

**Just to put the injection operation vs. the overall Morgantown Mine Pool into perspective, I did a little digging and came up with the following information. Much of this comes from the application submitted to support the UIC permit.**

- 1. It's estimated the total Morgantown Mine Pool (of which the Blacksville #1 Mine is a part) contains 56 billion gallons of water.**
- 2. CONSOL has indicated that they will treat upwards of 5700 gal/min. of mine pool water at their Flaggy Meadows facility (4300gal./min.) and Sears facility (1400 gal/min.) I do not know whether these facilities are currently at this capacity.**
- 3. On average CNX assumed 8200 mg/l chloride would come from the coal bed methane produced fluid. Although we have seen #'s this low, they have typically been higher. The Pittsburgh coal seam, where the produced fluid is injected, has a background quality of between 18,000 - 22,000 TDS. So the chlorides are likely more than 8200 mg/l background in the injection zone.**
- 4. Based on the total volume of water in the mine pool just in the Blacksville area, it has been calculated that dilution would bring the chloride content down to 900 mg/l. This is based on the 8200 mg/l figure.**
- 5. CONSOL did not believe that a concentration of 900 mg/l chloride would have an**

impact on them being able to meet the discharge limitation for chloride at Flaggy Meadows or Sears (225-350 mg/l.) Not sure whether each of these facilities has different permit conditions?

6. The UIC permit allows 150,000 barrels of produced fluid to be injected per month. This is equal to 5000 barrels per day or about 210,000 gallons per day (42 gallons = 1 barrel). 210,000 gallons per day = 145.83 gallons per minute. So, if CONSOL treats mine pool water at 5700 gallons per minute, the injection well only equates to about 2.5 percent of this total. And who knows how long it takes to travel from the injection well to Flaggy Meadows or Sears, if it ever gets there? In addition, if you compare the total volume of fluid injected on a daily basis versus the total volume in the Morgantown Mine Pool it equals about  $3.7 \times 10^{-6}$  gal. That's why you've heard us say, that the injection well's contribution is a drop in a very large bucket.

Even if these numbers are off a little it's difficult to blame the fish kill or the high TDS in the Mon River on this injection well. I know the well is an easy target, and we've certainly had compliance issues with the facility which we've taken action to correct. But to always point fingers at this facility, at least in my opinion, is shortsighted. If the well is operated as it was intended, in accordance with the permit conditions, then it should not be an issue with respect to what's going on. Has anyone checked for illegal discharge directly into the tributary or is there a POTW upstream that could have released a large slug of waste? There are any number of possibilities that could kill the fish kill and cause high TDS in the Mon.

S. Stephen Platt  
U.S. EPA, Region 3  
Ground Water & Enforcement Branch (3WP22)  
1650 Arch Street  
Philadelphia, PA 19103  
215-814-5464



9/4/09 Sampling Dunkard Creek				
Sampling Sites				
Parameter	Sample #1	Sample 2	Sample #3	Sample #4
NH3-N, mg/l	1.86	<0.04	0.07	<0.04
Al, mg/l	0.0278	0.128	0.0791	0.0871
Cr, mg/l	0.0013	<0.001	0.0013	<0.001
Cu, mg/l	<0.002	<0.002	<0.002	<0.002
Fe, mg/l	0.877	0.403	0.434	0.19
Pb, mg/l	<0.003	<0.003	<0.003	<0.003
Mn, mg/l	1.17	0.154	0.862	0.195
Se, mg/l	0.0067	<0.02	<0.02	<0.02
Zn, mg/l	0.0051	0.0058	0.0044	0.0051
TDS, mg/l	18900	1940	5790	1310
TSS, mg/l	56	12	26	18
Chloride, mg/l	4000	302	1270	246
Sulfate, mg/l	6590	840	2360	579
COD, mg/l	105	16	20	28
TOC, mg/l	3.22	4.94	4.72	7.71
Beta-BHC, mg/l	<0.0000016	<0.0000016	<0.0000016	0.000084

All other pesticide, volatile and semi-volatile results were non-detect

Sample #1 - WV Fork of Dunkard Ck D.S. of Blacksville 2 Mine  
Sample #2 - WV Fork of Dunkard Ck U.S of Blacksville 2 Mine  
Sample #3 - PA Fork of Dunkard Ck  
Sample #4 - Dunkard Ck at Low Water Bridge at Buckeye Church



----- Forwarded by Stefania Shamet/R3/USEPA/US on 09/17/2009 09:55 AM -----



**Louis**

**Reynolds/R3/USEPA/US**

**09/16/2009 01:38 PM**

**To Stefania Shamet/R3/USEPA/US@EPA**

**cc**

**Subject Re: Dunkard fish kill**

**Blacksville #2 Mine has been putting out high conductivity water for at least a month - very likely much longer. This water seems to be very high in chlorides. The amount of TDS and chlorides in the water, over time, in that amount, could be toxic to**



**mussels, fish, and salamanders.**

**Because the kill is continuing, and fish are still seeking refuge in tributaries, it is likely that the contaminants that are bothering the fish (and killing them) are still in the water. I think it unlikely that, given the place is crawling with regulators, that anyone is continuing to illegally dump. If this is all coming from some mystery contaminant that was dumped down a bore hole into a mine pool that is then pumped and released by consol, the source is still the discharge, even though the responsibility might be foggy.**

**I talked with Dr. Tom Simon of the USFWS yesterday and he agreed that the way the kill is progressing is very similar to a kill he witnessed from a brine spill that he had seen in Indiana.**

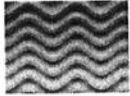
**I apologize for the frustration of my previous email - I was out of line.**

**Lou**

**Lou Reynolds  
USEPA Region III  
Freshwater Biology Team  
1060 Chapline St. Ste. 303  
Wheeling, WV 26003-2995  
P 304-234-0244  
F 304-234-0260**



----- Forwarded by Stefania Shamet/R3/USEPA/US on 09/17/2009 09:55 AM -----



**Louis  
Reynolds/R3/USEPA/US  
09/11/2009 12:47 PM**

**To Chad Harsh/R3/USEPA/US@EPA  
cc Amy Bergdale/R3/USEPA/US@EPA, Frank  
Borsuk/R3/USEPA/US@EPA, Greg  
Pond/R3/USEPA/US@EPA, Kelly  
Krock/R3/USEPA/US@EPA, Margaret  
Passmore/R3/USEPA/US@EPA, Stefania  
Shamet/R3/USEPA/US@EPA**

**Subject Re: Further Update -- Re: Fw: fish kill on dunkard  
Cree, WV and PA - update**

**Regarding "higher than normal": I think our benchmark for "normal" is a bit out of whack. Normal, for Dunkard Creek, is likely from 300-400. As recently as the year 2000, it was between 800-1200. We are now seeing from 2000-5000. This is probably something like 10 X normal for Dunkard Creek. The West Virginia Fork of Dunkard is an impaired stream. Complete loss of aquatic life use downstream of the consol discharge. I can't see how ANY discharges could be permitted for that stream.**

**The current fish kill is certainly related to conductivity. How exactly, I am not certain. We will have to wait until the analytical comes back from WVDEP and PADEP. That will help us the sort this out.**

**Is it ongoing. Again - not so sure. It seems as though the slug of toxic water has moved downstream toward and past Mt. Morris. It will soon hit another "dead zone" in Dunkard (from AMD). We will likely see no kill there because its already impaired from AMD. Then its into the Mon.**

**Lou**

**Lou Reynolds  
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